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U2100A Series Digital IO, 32-Terminal Devices

Data Sheet

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Features

- **Up to 32 input terminals and 32 output terminals**
- **Supports input voltage ranging from 0 V to 24 V**
- **5 V to 24 V external supply for external load**
- **Opto-isolated IO channels with maximum transient voltage of 1500 V_{peak}**
- **SCPI compatible**
- **Compatible with a wide range of Application Development Environments**
- **Fuse-protected output channels (shared by eight terminals)**

Introduction

The Agilent U2100A Series devices are portable USB Digital IO (DIO) device that offers you cost-effective and affordable digital data acquisition solution.

The U2100A Series DIO devices are suitable for highly demanding industrial applications such as driving relays, actuators, and valves. It also acts as an interface to industrial sensors; limit applications include industrial control and automation, isolated data communication, logic level interface, and laboratory automation. In addition, the DIO device provides isolation to allow robust industrial automation applications.

There are three U2100A Series DIO models:
- **U2121A** – 16-Terminal Digital Input and 16-Terminal Digital Output
- **U2122A** – 32-Terminal Digital Input
- **U2123A** – 32-Terminal Digital Output

Flexibility to Meet Industrial Demands with Various Features

- Quick and easy USB setup
- Opto-isolation for more reliable and improved signal quality
- High isolated transient voltage protection of the digital IO lines is able to protect your system from being damaged
- Programmable power-up state ensures glitch-free operations when connected to industrial automation instruments
- Watchdog timer protects your instruments against any unexpected crisis with its fail-safe feature
- Digital-filtering function filters out unwanted glitches and pulses
- Edge detection detects change of input signal without continuously reading the input

Glitch-free operations with programmable power-up states

The programmable power-up state is an important function because it allows you to preconfigure the state of all the output lines of the device to a desired state when powering up. This function is incorporated in the U2121A/U2123A DIO. It ensures glitch-free operations for use with automation instruments such as motors, valves, and relays. These user-configurable power-up states help ensure that the device powers up in a known state. They can be programmed using Agilent DIO Diagnostics software or specific SCPI commands.

Fail-safe feature with watchdog timer

The watchdog timer is incorporated into U2121A/U2123A DIO as a fail-safe feature. It is useful whenever the device is connected to industrial actuators such as motors, valves, and relays. It is a robust timer that allows you to set critical output lines to a known state in the event of crisis such as software failure, driver crash, or loss of any USB communication link. This is an important function because it protects you against any unexpected crisis.

Software initialization with edge detection

You can monitor the change of states on all the input lines of U2121A/U2122A DIO through this edge-detection capability. With edge detection, you can also set the configuration of the individual interrupt enable register and the desired positive and/or negative edge-detection register masks before any of the input lines perform edge detection on the input signal. The maximum rate of edge detection is determined by the software response time that varies from system to system.

Filter undesired glitches and Noises with digital filtering

This versatile digital-filtering functionality is another important feature for ensuring correct and precise readings. It is incorporated in the U2121A/U2122A DIO. This function is important for applications in noisy industrial environments because it helps you filter out undesired glitches or unwanted pulses from entering the input lines to prevent false and inaccurate readings. The digital filtering can be configured to filter out pulses that are shorter than the preprogrammed timing interval. All the input lines have this digital-filtering feature and can be enabled individually.

Affordable, portable, and reliable

Highly portable at only 154.60 mm high, 120.00 mm wide, and 32.60 mm deep, it is ideal for both industrial and scientific environments. The U2100A Series DIO can operate within its rated specifications from 0 °C up to 55 °C and at altitudes up to 3000 m.

The robust design of the U2100A Series DIO guarantees reliable operation extending across industrial and education environments. It has also been tested in accordance to major safety and regulatory standards.

Quick and easy connectivity

The U2100A Series DIO comes with simple and reliable USB (12 Mbps) connectivity. The USB interface is USBTMC-USB488 compatible, making system connections quick and easy. Besides that, the U2100A Series DIO interfaces with detachable terminal blocks for ease in field wiring, which gives you a simple and trouble-free setup. The detachable terminal blocks also offer you long-term ease of maintenance.

The U2100A Series DIO comes with Agilent IO Libraries Suite 14.2 and Agilent DIO Diagnostics software. The IO Libraries provide robust instrument control and work with the software development environment of your choice.

SCPI, IVI-C, and IVI-COM compatible

You can use either the Agilent U2121 IVI Driver or SCPI commands (in any programming environment) to communicate with the U2100A Series DIO. This helps you save time and allows you to work with the software of your choice.

For more information on the Agilent U2121A Series Digital IO and other instrument drivers and software, visit http://www.agilent.com/find/U2121A

System Requirements

Agilent connectivity software included
Agilent IO Libraries Suite 14.2 or higher

Minimum system requirements

• PC hardware	1.6 GHz Pentium IV or higher, 512 MB RAM or higher, 1 GB hard disk space, CD-ROM drive
• Operating system	Windows® XP Professional or Home Edition, Service Pack 1 or later, Windows® 2000 Professional, Service Pack 4 or later
• Connectivity interface	USB 2.0 Full Speed

Software driver support for programming languages

- Software driver:
  IVI-COM
- Compatible with programming environments:
  Agilent VEE, Microsoft Visual Studio® .NET™, C/C++, Microsoft Visual Basic® 6, LabVIEW, and LabWindows/CVI

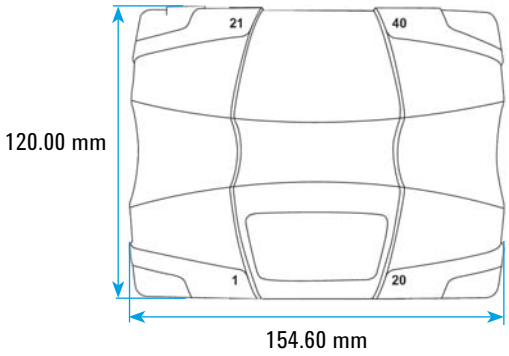
Product Specifications

	Agilent U2121A	Agilent U2122A	Agilent U2123A
Digital IO lines	16 input, 16 output	32 input	32 output
INPUT CHARACTERISTICS			
Input voltage	0 V to 24 V	0 V to 24 V	
Input logic low voltage	< 1.3 V	< 1.3 V	
Input logic low current source	3 mA Max	3 mA Max	
Input logic high voltage	> 3.5 V	> 3.5 V	
Maximum rating Input voltage	26 V Max	26 V Max	
Input propagation delay	100 µs (Opto-isolator)	100 µs (Opto-isolator)	
Maximum Transient Voltage[1]	1500 V_{peak}	1500 V_{peak}	
OUTPUT CHARACTERISTICS			
Output load voltage	24 V max		24 V max
Output low voltage	1.2 V max		1.2 V max
Max output sink current per terminal with only one terminal "on"	400 mA max		400 mA max
Max output sink current per terminal for all terminals "on" in a channel	100 mA per terminal		100 mA per terminal
Max output sink current per channel (8 terminals per channel)	800 mA (max 1600 mA for 2 channels)		800 mA (max 3200 mA for 4 channels)
Maximum rating Max voltage Fuse protected	26 V max 1.5 A per channel (nominal)		26 V max 1.5 A per channel (nominal)
Output propagation delay	100 µs (Opto-isolator)		100 µs (Opto-isolator)
Maximum Transient Voltage[2]	1500 V_{peak}		1500 V_{peak}
OTHER FEATURES			
Device type	Software timed		
Additional features	• Programmable power-up states • Watchdog timer • Edge detection • Digital filter	• Edge detection • Digital filter	• Programmable power-up states • Watchdog timer
USB POWER REQUIREMENTS			
USB	USB 2.0 Full Speed		
USB voltage	5 V (4.75 to 5.25 V)		
USB current consumption	100 mA min, 500 mA max, 120 mA nominal	100 mA min, 500 mA max, 120 mA nominal	100 mA min, 500 mA max, 120 mA nominal
USB suspend	200 µA min, 2.5 mA max, 250 µA nominal	200 µA min, 2.5 mA max, 250 µA nominal	200 µA min, 2.5 mA max, 250 µA nominal

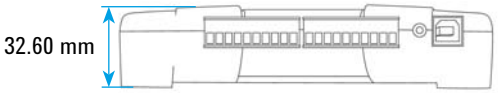
[1] Maximum transient voltage between DI_{in} and V–
[2] Maximum transient voltage between DO and V–

Product Outlook and Dimensions

Top View



Front View



General Characteristics

OPERATING ENVIRONMENT
- Full accuracy at 0 °C to 55 °C
- Full accuracy up to 90 % RH at 40 °C (Non-condensing)
- Altitude up to 3000 m

STORAGE COMPLIANCE
–40 °C to 70 °C

SAFETY COMPLIANCE
Certified with:
- IEC 61010-1:2001 / EN 61010-1:2001 (2nd Edition)
- USA: UL61010-1: 2004
- Canada: CSA C22.2 No.61010-1:2004

ENVIRONMENTAL CONTROL
Pollution Degree 2

EMC COMPLIANCE
IEC/EN 61326: 1998 / CISPR 11, Group 1, Class A

SHOCK & VIBRATION
IEC / EN 60086-2

PHYSICAL CHARACTERISTICS
- I/O connectors: USB series B receptacle, 10 position terminal block (4 pieces)
- Terminal block I/O wiring: AWG 18 to 26 conductor wires with insulation stripped from the end by 7 mm. Use suitable ferrule for multistranded wires (do not solder).
- Terminal block screw torque: 2 kg-cm

DIMENSION (WxDxH)
154.60 mm x 120.00 mm x 32.60 mm

WEIGHT
270 g / 0.595 lbs

WARRANTY
Three years

Standard Shipped Components

- Agilent U2100A Series Digital IO, 32-Terminal device
- USB Interface Cable
- Terminal Block
- DIN Rail Clamp
- Connector Pin Labeling
- Quick Start Guide
- Product Reference CD-ROM
- Agilent Automation-Ready CD (contains the Agilent IO Libraries Suite)

Optional Accessory

U2121A-101 RF Switch Driver Board

Features

- **Controls and monitors up to five multiple RF switches at any one time**
- **Quick and easy setup with bundled RF switch driver software and cables**
- **Hassle-free connection setup to minimize complex DC connections, enabling more focus on RF signal routing**
- **Programmable U2100A Series DIO power-up configurations to allow storage of predefined RF switch states**
- **Watchdog timer provides fail-safe capability to preserve known states**
- **Supports fail-safe and latching-relay switches for maximum flexibility**

Introduction

The Agilent U2121A-101 (also known as U2931A) RF switch driver with cable is an adapter board designed for use with the Agilent U2121A digital IO device. This solution (consist of U2121A device and U2931A board) is suitable for small, low-cost RF switching test systems using multiple signal sources. You can easily control various types of RF switches using the RF switch driver board in your application. It comprises five RF switch driver channels and one general IO terminal. Each channel is preprogrammed to drive three different types of Agilent RF switches, namely the Agilent 8762/63/64 coaxial switches, microwave 8765x SPDT switches, and N1810/11/12 coaxial switches[1].

Setup and configuration of the RF switch driver board are effortless. In fact, a simple and intuitive graphical user interface (GUI) programmatic control is made readily available with your purchase to allow you to monitor up to five channels in the switch board. This is ideal for R&D, design validation, and education environments, which typically require multiple switches and multiple instruments in the test configuration.

1 See Table 1 for details.

High-performance, low-cost switching to meet your needs

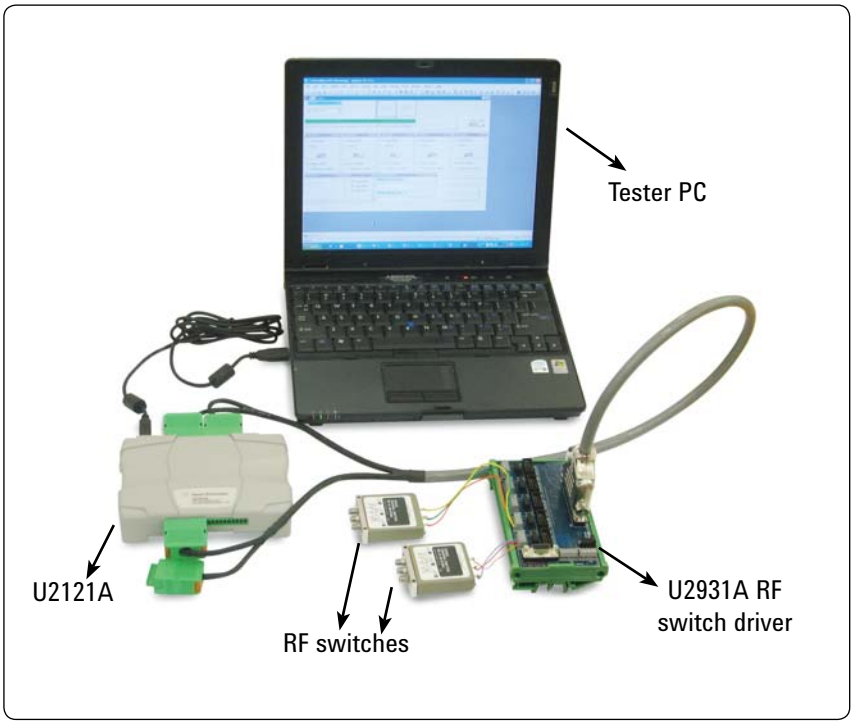


Figure 1. Example of a general RF test system

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Features You Need

Supports multiple switches
The U2121A-101 board supports three types of Agilent RF switches and has the flexibility to drive up to five RF switch driver channels at any one time. You can choose to drive the same switches in all five channels or a combination of three different switches for the five channels. The board is designed for simplicity such that only one type of switch can be used in a channel at a time.

Easy-to-use bundled software
The bundled RF switch driver software is simple and easy to use. The software comes with a GUI that allows you to configure and control your RF switch driver board without performing any programming. Control instructions and examples are available in multiple platforms for users who prefer to customize their software.

Hassle-free hardware connection
The U2121A-101 board is connected to the U2121A DIO device using the provided interface cable. The cable is equipped with a 37-pin D-sub connector on one end and four 10-way terminal block connectors on the other. The switches are powered by the provided 24 VDC, 2.5 A power adapter. This straightforward connection is portable and simplifies the system hardware connection.

Programmable power-up configuration
The bundled software allows you to save your current configurations as the default U2121A DIO device's power-up configuration. This allows your defined RF switch states to be restored. Upon powering up, the saved RF switches' directions and paths will be restored as its power-up settings.

Unique watchdog timer
The watchdog timer provides fail-safe capability to restore saved configurations in the event of a software timeout, for instance, your PC freezes or reboots. It allows the DIO device to reset its RF switches' directions and paths back to your preset safe configuration to ensure that your connected devices remain in a safe configuration environment.

For more information on the Agilent U2121A-101 RF switch driver board and other instrument drivers and software, visit http://www.agilent.com/find/U2931A

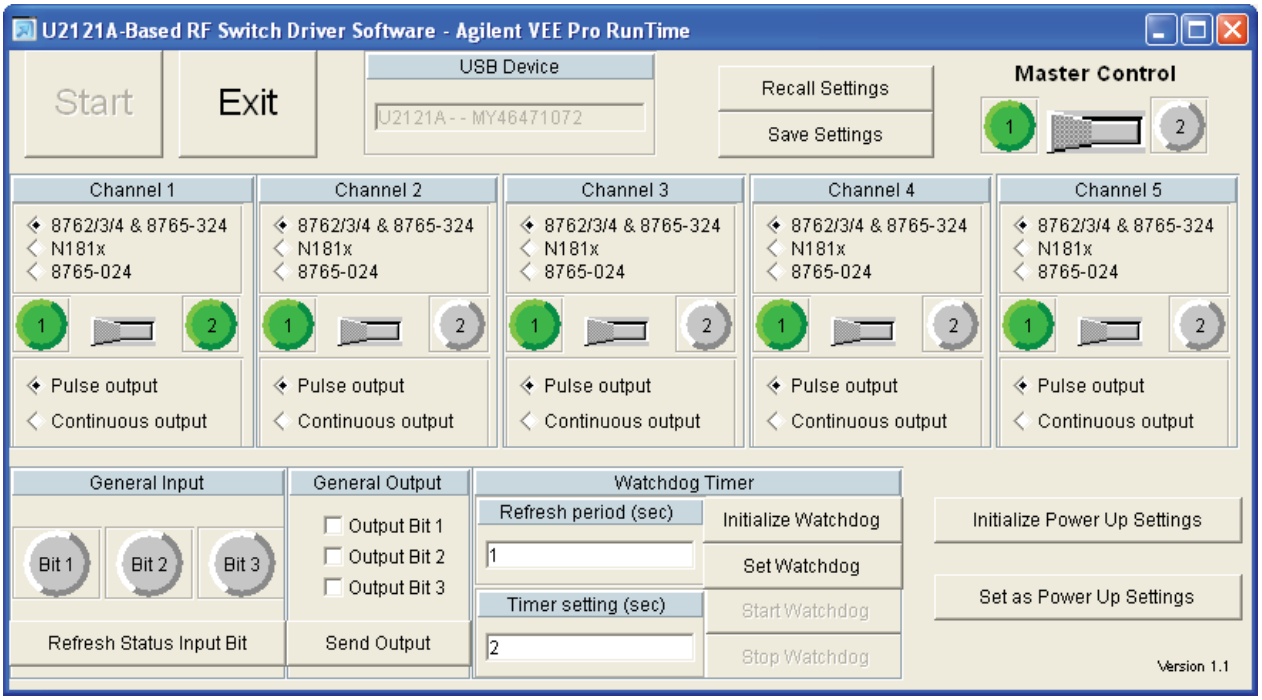
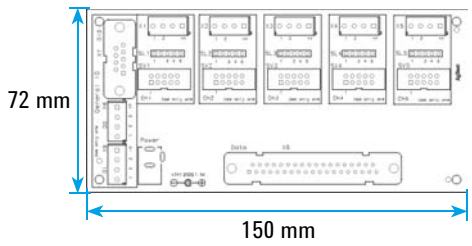


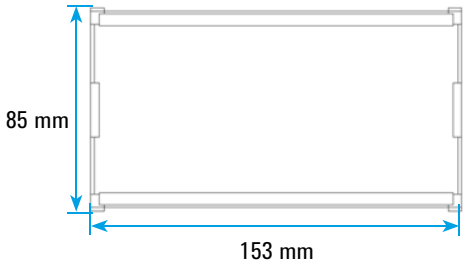
Figure 2. Easy-to-use RF switch driver application software GUI

Product Outlook and Dimensions

Top view (without casing)

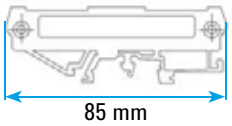


Top view (with casing)



Front view (with casing)

Side view (with casing)



Supported Switches

Table 1. Types of switches supported by U2121A-101 RF switch driver board

Switch/ Attenuator	Coil Voltage	Connection Type	Drive Options
N1810UL/TL N1811TL N1812TL	Option 124 24 VDC	Option 201 D-Sub 9-pin female	Option 402 Position Indicators
8762A/B/C/F 8763A/B/C 8764A/B/C	Option 024 24 VDC	Solder lugs	STD Direct coil for open drain
8765A/B/C/D	Option 324 24VDC	Solder terminals	STD Direct coil for open drain
8765A/B/C/D	Option 024 24 VDC	Ribbon cable terminated with single in-line	STD Direct coil for open drain

U2121A-101 RF Switch Driver Application Software Requirements

Agilent connectivity software included Agilent IO Libraries Suite 15.0 or higher	
Minimum system requirements	
• PC hardware	1.6 GHz Pentium IV or higher, 512 MB RAM or higher, 1 GB hard disk space, CD-ROM driv
• Operating system	Windows XP Professional or Home Edition, Service Pack 1 or later, Windows 2000 Professional, Service Pack 4 or later
Software required	
• Agilent VEE	Runtime version 8.5[1] or higher
• Agilent U2121A IVI Driver	Version 1.0.9.0[1] or higher
• Microsoft® .NET Framework	Version 1.1 and 2.0[1]

[1] Bundled with Agilent RF Switch Driver Application Software installer.

General Characteristics and Specifications

POWER CONSUMPTION
- +24 VDC, 2.5 A
- Isolated ELV supply source

OPERATING TEMPERATURE
0 °C to 40 °C

STORAGE TEMPERATURE
–40 °C to 70 °C

OPERATING HUMIDITY
Up to 85% at 40 °C (non-condensing)

STORAGE HUMIDITY
5% to 90% RH (non-condensing)

EMC COMPLIANCE
- IEC 61326:2002/EN61326:1997+A1:1998+A2:2001+A3:2003
- Canada: ICES-001:2004
- Australia/New Zealand: AS/NZS CISPR11:2004

SAFETY
IEC 61010-1:2001/EN 61010-1:2001 (2nd edition)

DRIVING CURRENT PER CHANNEL
300 mA (max)

TOTAL CURRENT
1500 mA (max)

IO CHANNELS FOR RF SWITCH
5 channels

GENERAL IO
3 digital inputs and 3 digital outputs

BOARD DIMENSIONS (W x D)
150 mm x 72 mm

CASING DIMENSIONS (W x D x H)
153 mm x 85 mm x 38 mm

WEIGHT
- With casing: 146 g
- Without casing: 86 g

Ordering Information

To order the U2931A RF switch driver, please select the U2121A and U2121A-101 ordering options. This will include the U2121A digital IO device and U2121A-101 RF switch driver board and cable. You can also order the U2931A RF switch driver board as a standalone unit by choosing the U2931A-101 ordering option.

Ordering Option (with U2121A)	Ordering Option (as standalone)	Description
U2121A-101	U2931A-101	U2121A-101 RF switch driver board
	U2931A-102	U2121A-101 RF switch driver board cable

Optional accesory

Ordering Options	Description
Y1157A	9-to-10 pin extension cable for N181x — supplies to build 4 cables

Änderungen und Irrtümer vorbehalten. dataTec 06-03-2013 Update Agilent: July 10, 2010 5989-5725EN

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